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ROOTING CUTTINGS FROM DOUGLAS-FIR, WHITE FIR, AND CALIFORNIA RED FIR CHRISTMAS TREES

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Christmas tree growers in California have asked geneticists to help improve the characteristics of the wild species they are cultivating. The preferred Christmas trees of California are Shasta red fir (Abies magnifica A. Murr.), white fir (A. concolor (Gord. & Glend.) Lindl.), and Douglas-fir (Pseudotsuga menziesii (Mirb.) Franco). The individuals of these species are quite diverse. Trees of all shapes, sizes, and needle characteristics can be found in young plantations or natural stands. Unique combinations of these characters are found in some trees. Many outstanding types could be commercially exploited if their characteristics proved to be genetically determined.

Production of clones through vegetative propagation of desirable individuals would permit testing under a variety of environments and give a rapid means of assessing genetic differences in young trees. Furthermore, outstanding forms might be perpetuated indefinitely for commercial use if they could be propagated from cuttings. Christmas trees about to go to market would be a likely source of these cuttings.

Starting December 7, 1956, we tried to root a few cuttings of these species. We cut trees of a size suitable for Christmas decoration, 5 to 8 feet tall. The trees were growing in natural stands on the west slope of the Sierra Nevada above Placerville. At the Institute of Forest Genetics, we cut about 6 inches of the growth of the current year. The cuttings from the tips of primary branches and those from the tips of the secondary branches were separated, but we subsequently did not detect a difference in callusing or rooting associated with branch order.

We treated half of the cuttings in each group by dipping the basal portion in 100 mg. of indolebutyric acid in 50 grams of talcum. The cuttings were planted in a greenhouse in three media: Canadian peat moss, a sharp

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Tahoe sand, and Sponge Rok. The rooting bed was covered with framed glass, and the bed was heated from the bottom by a lead cable controlled by a thermostat set at 75°F. Periodically, we recorded the number of cuttings developing callus and roots (table 1).

Callus formation started quickly. Callus appeared on some cuttings by December 14. By the end of December, many cuttings showed callus, and after 1 month nearly all cuttings were callused. If the indolebutyric dip had any effect, it was to delay the formation of callus. The peat medium also seemed to delay callus formation somewhat.

Root formation started generally in mid-April, but the process was not continuous; only 1 cutting struck a root during May and June. Then by July 24, another group of cuttings had struck roots. This periodicity of root initiation is unexplained. The indolebutyric dip did not affect final rooting of Douglas-fir and white fir. If anything, dipped cuttings were slower to form callus and to strike roots. The best medium for rooting Douglas-fir was Tahoe sand; for white fir, Sponge Rok. The final rooting of all cuttings was:

Douglas-fir	36 percent
White fir	32 percent
California red fir	None

Table 1.--Number of cuttings with roots, callus, or neither, by species, rooting medium, and time in media

Rooting medium and time in media	Douglas-fir cuttings- -				White fir cuttings- -			
	Rooted		Callused	Neither	Rooted		Callused	Neither
	No.	Pct.	No.	No.	No.	Pct.	No.	No.
SPONGE ROK								
1 month								
treated [1]	0	--	9	1	0	--	10	0
untreated	0	--	10	0	0	--	10	0
Total	0	--	19	1	0	--	20	0
12 months								
treated	1	--	6	[2] 0	1	--	8	[2] 0
untreated	4	--	6	0	10	--	0	0
Total	5	25	12	[2] 0	11	55	8	[2] 0
TAHOE SAND								
1 month								
treated	0	--	10	0	0	--	9	1
untreated	0	--	10	0	0	--	10	0
Total	0	--	20	0	0	--	19	1
12 months								
treated	5	--	5	0	2	--	5	[2] 0
untreated	4	--	6	0	0	--	10	0
Total	9	45	11	0	2	10	15	[2] 0
PEAT MOSS								
1 month								
treated	0	--	5	0	0	--	4	1
untreated	0	--	5	0	0	--	5	0
Total	0	--	10	0	0	--	9	1
12 months								
treated	2	--	3	0	0	--	4	1
untreated	2	--	3	0	3	--	2	0
Total	4	40	6	0	3	30	6	1
Total, 12 months	18	36	29	0	16	32	29	1

[1] Treatment: dipped in 100 mg. indolebutyric acid in 50 g. talcum. Experimental material included 25 treated and 25 untreated cuttings from primary branches of each species.

[2] Remainder of 10 or 20 cuttings were dead.